

## Plain X-ray

### A) Stones:

#### 1-Renal stones:

##### •Comment on x-ray:

Study	Plain X-ray
View	Antero-posterior view
Centralization	Patient is well centralized
Preparation	Bad (air bubbles shouldn't be existed)
Extension	Bad (should show last 2 ribs and 1 inch below symphysis pubis)
Bone	No abnormality
Soft tissue shadow	Normal kidney & psoas shadows
Finding	Radio-opaque shadow in the region of Lt kidney most probably renal stone in the lower calyx



##### •Questions:

##### -Causes of radio-opaque shadows in the region of kidney:

1-Renal stones 2-Gall bladder stone (if right) 3-Foreign body in stomach, small intestine or colon  
4-Nephrocalcinosis 5-Calcified (renal cyst, LNs, TB, liver hydatid cyst, atheromatous renal vessels)

##### -Bony abnormalities of urologic importance:

1-Congenital: •Spina bifida → Nocturnal enuresis •Separation of pubic bones → Ectopia vesica  
2-Traumatic: •Fracture last rib → renal injury •Fracture spine → Neurogenic bladder, Impotence  
•Fracture of pelvis → Urethral and bladder injuries  
3-Inflammatory: •Pott's disease → associated renal T.B. •Ankylosing spondylitis → renal failure  
4-Neoplastic: Bone secondaries of primary urinary system tumors

##### -Normal renal shadow / Abnormalities:

•Normal shadow: from top of 1<sup>st</sup> to bottom of 3<sup>rd</sup> or 4<sup>th</sup> lumbar vertebra with axis runs obliquely along the lateral borders of psoas muscle, if the 2 renal axes extended, they will meet at T10

##### •Abnormalities:

a-Absent: unprepared patient, perinephric abscess, congenitally absent or ectopic

b-Misplaced: renal ptosis, ectopic, suprarenal tumor

-Absent psoas shadow: 1-Renal lesion e.g. hydronephrosis, cyst 2-Retroperitoneal tumor

##### -Kidney stone vs Gall bladder stone

	Renal stone	Gall bladder stone
History	-pain in the loin (posterior) -pain radiated to the groin -associated LUTS, hematuria	-pain at gall bladder site (anterior) -pain radiates to shoulder -associated regurgitation & biliary dysplasia
Examination	Tenderness at renal angle -ve Murphy's sign	Tenderness anterior subcostal +ve Murphy's sign
Lat. X-ray	Radiopaque on or just behind spines	In front of the spines
Sonar	Intra-renal position	extrarenal

**-Clinical picture of the patient:**

1-Asymptomatic 2-Obstructive: renal pain, renal colic, renal swelling, anuria & acute renal failure  
 3-LUTS: ↑ frequency, burning micturition

**-Renal pain vs renal colic:**

	Renal Colic	Renal pain
Onset	Sudden	Gradual
Character	Spasmodic	Dull
Course	Intermittent	Constant
Offset	Sudden	Gradual
Cause	Stones	Pyelonephritis
Site of Referral	Loin, Testis, Inner site of thigh	Loin only

**-Treatment:****A) Treatment of Renal colic**

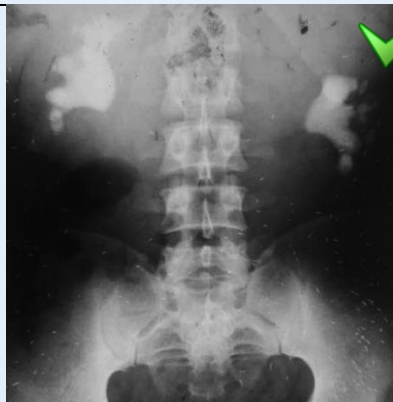
1-Parenteral analgesics (NSAIDs, Opiates) 2-Antiemetics (Metoclopramide)

**B) Treatment of Renal calculi (remember to answer acc. to the size of stone in x-ray)**

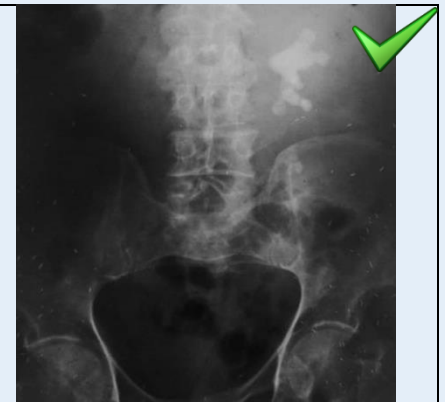
Method		Indications	Contraindications
i) Medical			
1-Fluids +/- diuretics 2-Analgesics & antispasmodics 3-Urinary antiseptics 4-Regular follow up		1-Small (< 0.5 cm) 2-No back pressure 3-No distal obstruction 4-No infection evidence	
ii) Interventional			
●ESWL	Fragmentation of stone by extracorporeal shock wave lithotripsy	1- < 2 cm 2-Radio-opaque stone 3-Patent UT below	-Non uro: Pregnancy Coagulopathy -Uro: >2 cm, distal obs.
●PCNL (Endoscopy) Percutaneous nephrolithotripsy	Types: Ultrasonic, Pneumatic Laser, Electrohydraulic	1-Large > 2cm 2-Hard (e.g. cystine) 3-ESWL Failure	1-Bleeding diathesis 2-Cong. anomalies
●Combined PCNL then ESWL			
iii) Open Surgery (via Morris incision)			
1-Pyelolithotomy 2-Nephrolithotomy 3-Pyelonephrolithotomy 4-Nephrectomy (if non functioning kidney)		If ESWL & PCNL fail or are contraindicated	



Multiple Rt calyceal stones



Bilateral staghorn stones



Left staghorn stone

**2-Ureteric Stones:**

Finding	Radio-opaque shadow in the course of Rt ureter most probably upper ureteric stone
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**-Course of the ureter:**

Starts at the second lumbar transverse process, runs vertically and ends at bladder opposite the lateral side of the lower part of the coccyx

Divided by sacroiliac joint into 3 parts:

- Upper ⅓: above
- Middle ⅓: on
- Lower ⅓: below

**-Causes of radio-opaque shadow on ureter course:**

- 1-Ureteric stones
- 2-Localized bilharzial calcification
- 3-Foreign body in ileum or colon
- 4-Stone in ectopic kidney
- 5-Calcified mesenteric LNs

**-Clinical picture:**

- 1-"Renal Colic"
- 2-Hematuria
- 3-LUTS: e.g. ↑ frequency
- 4-Renal mass (if hydronephrosis occurs)
- 5-Calicular anuria: if obstruction is bilateral or in only functioning kidney

**-Further investigations:**

- 1-Urine analysis: Hematuria, pus cells, crystals
- 2-Ultrasongraphy: back pressure, the other kidney presence and stones
- 3-IVU: renal function, degree of obstruction, ureteric stricture, other kidney state
- 4-Non contrast abdominal CT: detect all types of stones (i.e. detect radiolucent stones e.g. uric acid)

**Treatment:****A) Treatment of Renal colic**

- 1-Parenteral analgesics (NSAIDs, Opiates)
- 2-Antiemetics (Metoclopramide)

**B) Treatment of Renal calculi (remember to answer acc. to the size & site of stone in x-ray)**

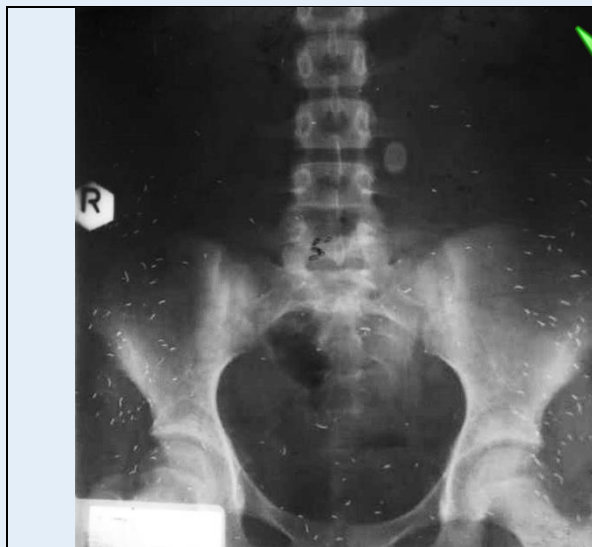
Method	Indications
<b>i) Medical (Conservative/Expectant)</b>	
1-Fluids +/- diuretics 2-Analgesics & antispasmodics 3-Urinary antiseptics 4-Regular follow up	1-Small (< 0.5 cm) 2-No back pressure 3-No distal obstruction 4-No infection evidence
<b>ii) Interventional</b>	
•Upper ⅓	• stone < 1 cm → ESWL •stone > 1 cm → open surgery
•Middle ⅓	• open surgery is treatment of choice
•Lower ⅓	• stone < 1.5 cm → Uteroscopy • stone > 1.5 cm → Open surgery
<b>iii) Open Surgery (Ureterolithotomy)</b>	
•Upper ⅓ → Lumbar incision •Middle ⅓ → Abernathy incision •Lower ⅓ → Midline suprapubic / Pfannenstiel's	-Large or multiple stones -Failed or contraindicated previous techniques

**In bilateral stones:**

- 1-If patient has a bad general condition → Dialysis
- 2-If patient has a good general condition:
  - a-Bad kidney function: start with the better kidney
  - b-Good kidney function: start with the most painful, if they're the same → the easier to operate on

Normal serum urea: 20-25 mg/dL  
Normal serum creatinine: 0.5-1.5 mg/dL





Lt upper ureteric stone



Rt middle ureteric stone



Lt lower ureteric stone



Multiple Rt lower ureteric stones

### 3-Bladder stones:

**Finding** Radio-opaque shadow in the Region of urinary bladder most probably Bladder stone

-Causes of radio-opaque shadow in bladder region:

- 1-Vesical (bladder) stones
- 2-Calcified fibroid in ♀
- 3-Foreign body in body in bladder, uterus (IUD), rectum
- 4-Calcified seminal vesicles in ♂
- 5-Calcified bilharzial ova

-Clinical picture:

- 1-↑Diurnal frequency
- 2-Burning micturition
- 3-Hematuria, pyuria
- 4-Urgency & incontinence
- 5-Severe pain at end of micturition
- 5-Acute retention (if stone impacts bladder neck)

-Bladder stone or Lower ureteric stone?

	Lower ureteric	Bladder
Shape	Ovoid or date shaped	Rounded
Site	Lateral	Midline above SP
X-ray	The same every time	Change with patient position





-Treatment: (NO medical)

**A) Endoscopic: (Only in adults not children)**

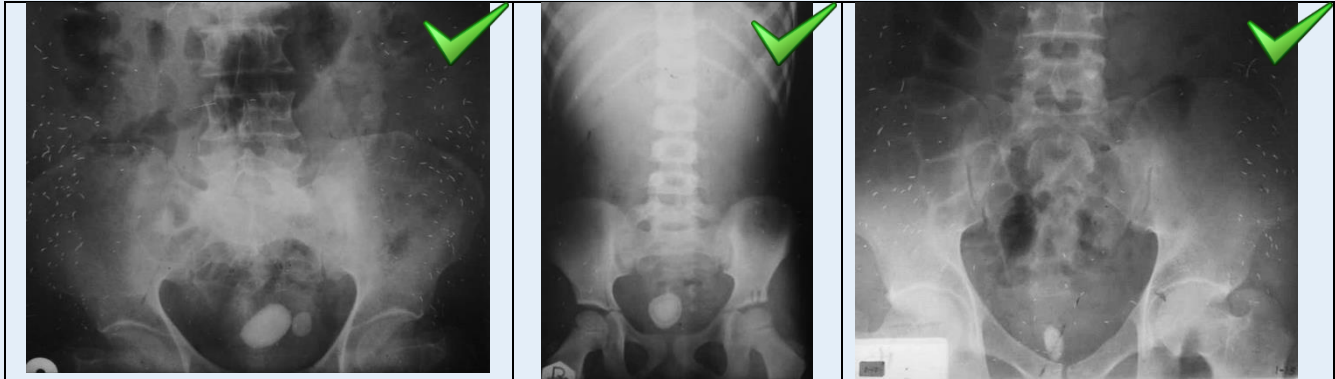
**1-Cystolitholapaxy:** Stone crushing mechanically by the use of lithotrite  
Stones up to 2.5 cm with absence of infection or stricture

**2-Cystolithotripsy:** Stones > 2.5 cm

**B) Open surgery (Adults + children)**

**Cystolithotomy**

- Big stones
- Stones in diverticulum
- Presence of huge BPH
- Failure of previous procedures



**4-Urethral Stones:**

Treatment:

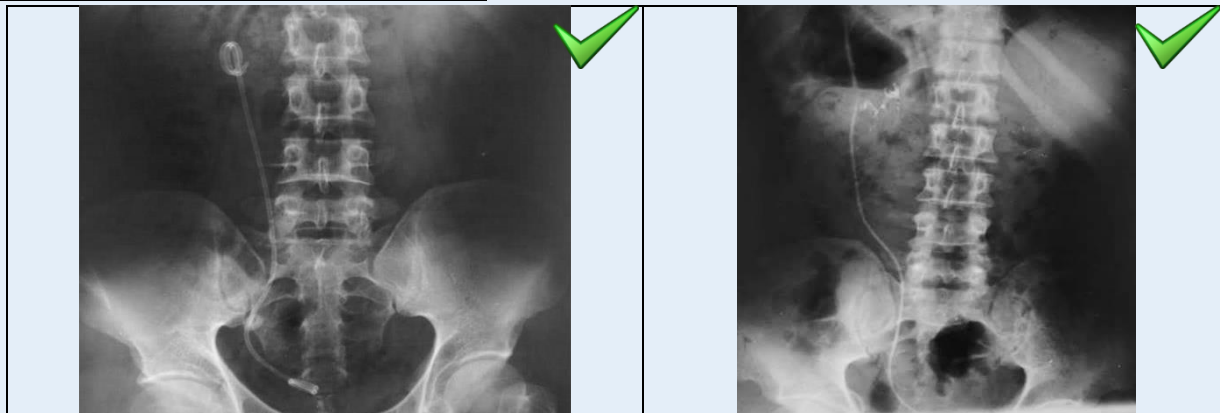
Prostatic	Litholapaxy or push to bladder then cystolithotomy
Membranous /Bulbous	Urethroscopy and removal by urethral forceps If fails open surgery
Penile	Gentle milking of the stone out of the meatus

-Anuria or Retention:

	Retention	Anuria
Desire	+ve	-ve
Supra pubic pain	+ve	-ve
Irritability	+ve	-ve
Supra pubic mass	+ve	-ve
Catheter	Urine	No urine



**Other findings in plain x-ray (Stents):**



Double J ureteric catheter

Non self retaining ureteric catheter

# 1-Intravenous urography (Excretory urography)

## -Phases of urography

Phase	Timing	Normal	Abnormal
1-Nephrographic	3-5 min	2 kidney shadows with homogenous dye distr.	Delayed → acute obs.
2-Pyelographic	10 min	Trumpet like pelvis with calyceal tree	Balloon → hydroneph.
3-Ureterographic	15 min	Interrupted appearance d.t. peristalsis	
4-Cystographic	20 min	Showing full bladder (See later)	

\*Post voiding film: normally no residual urine

## -Causes of non-visualized kidney:

- 1-Congenital: Renal aplasia – Ectopic kidney – Multicystic kidney
- 2-Traumatic: Nephrectomy – Renal artery occlusion
- 3-Inflammatory: Pyelonephrosis – T.B. of the kidney
- 4-Neoplastic: renal tumor occluding renal vein or pelvis
- 5-Obstructive: Stones – Bilharzial stricture – PUJO – UVJO
- 6-Physiologic: Reflex inhibition in renal colic (so postpone IVU for one week in case of renal colic)

## -Contraindications:

- 1-Sensitivity to dye
- 2-Liver & heart failure
- 3-Renal failure (blood urea > 120 mg/dL)
- 4-Thyrototoxicosis
- 5-Pregnancy
- 6-Multiple myeloma

## -Complications:

- 1-Thrombosis at site of injection
- 2-Allergic reaction
- 3-acute hepatic failure or heart damage

## A) Hydronephrosis:

**Comment** IVU, pyelographic phase, showing bilateral dilated renal pelves and ureters which suggests Bilateral hydronephrosis and hydroureter



## -What is meant by hydronephrosis?

Chronic aseptic dilatation of pelvi-calyceal system due to incomplete (partial) ureteric obstruction

## -Urographic signs of hydronephrosis: (Degrees)

- 1-Loss of fornices
- 2-Flattening of renal papillae (concavity loss)
- 3-Clubbing of renal papillae (Convexity)
- 4-Balloning
- 5-Non visualized (non-excretory): d.t. loss of concentrating power

## -Causes of hydronephrosis:

### 1) Obstructive:

#### a) Intramural (Intraluminal)

- 1-Stones
- 2-Blood clot (esp. organized ones)
- 3-Heavy fungal infections (fungal ball)
- 4-Foreign body (e.g. neglected stent as Double J → encrustations)
- 5-Urothelial tumors

#### b) Mural (wall):

- 1-Stricture Ureter: by Bilharziasis, T.B.
- 2-Tumors: (1ry / 2ry)
- 3-Congenital narrowing: -Ureteropelvic junction obst. -Ureterovascular junction obst.

#### c) Extramural:

- 1-Retroperitoneal mass (e.g. Enlarged LN, Lymphoma, hematoma)
- 2-Retroperitoneal Fibrosis
- 3-Gravid Uterus (pressure more on the right side)

### 2-Vesico-ureteric reflux

**-Clinical manifestations:**

- a) Obstructive symptoms: Renal colic, renal pain, renal swelling, hematuria, chronic renal failure
- b) Reflux: recurrent UTI, occasional renal pain during micturition
- c) Manifest. of complications: Infected hydronephrosis, infection & stone formation

**-Infected hydronephrosis vs Pyonephrosis**

	Infected Hydronephrosis	Pyonephrosis
How happens?	Obstruction then Infection	Both at same time
Affection	Pelvi-Calyceal system only	Pelvi-Calyceal + Parenchyma + Perinephric tissue (3 Stratal affection)
Symptoms	High grade fever, severe pain	Low grade fever, mild pain
Examination	Huge Swelling + Severe Tenderness	Just palpable mass , not tender
TTT	PCN + Further Kidney assessment	Nephrectomy

**-Treatment:**

- 1-Unilateral compensated: Treatment of the cause
- 2-Unilateral decompensated or advanced case: ttt of the cause + PCN
- 3-Bilateral decompensated or solitary kidney: ttt of the cause + PCN + Dialysis

**B) Congenital Anomalies:** “The anomaly isn’t the only diagnosis remember to search for pathology”**1-Ectopic kidney:**

- Types:**
- Simple (Lumbar, Pelvic): arrest of ascent, so it is mal-rotated
  - Thoracic
  - Crossed renal ectopia: migration to contralateral side +/- fusion, but its ureter opens at bladder at original side

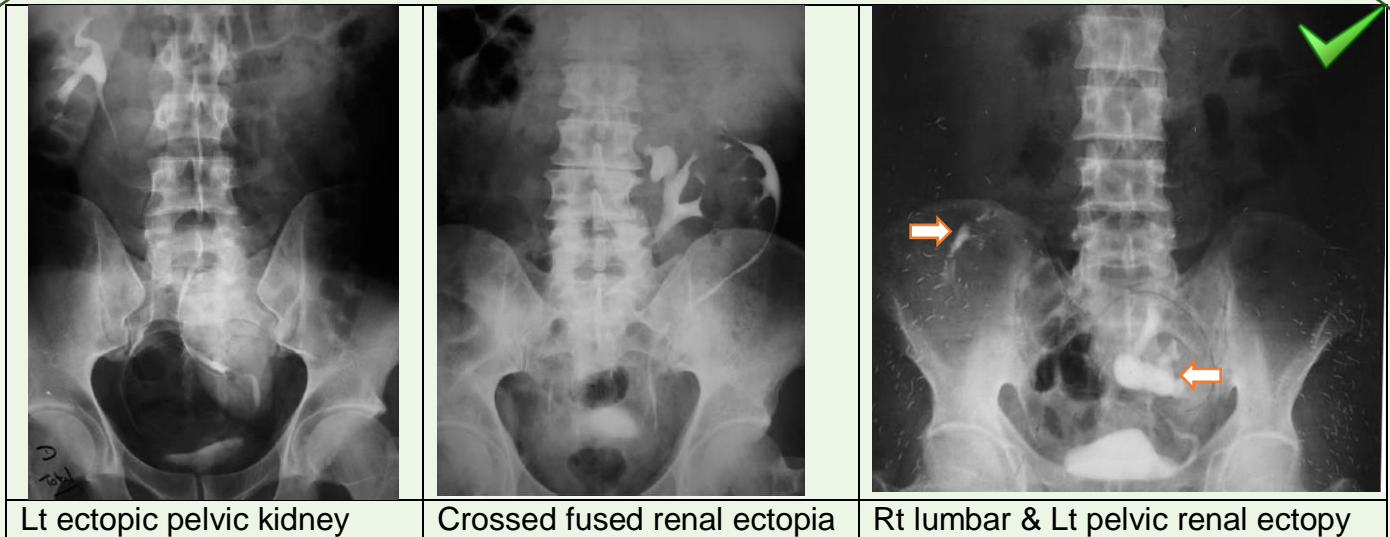
**C/P:** usually asymptomatic but it is liable for stasis, infection & stone formation

**Ectopic vs Ptosed:**

	Ectopic kidney	Ptosed mobile kidney
Ureter	Short, straight	Long, kinked
Blood supply	From surrounding big vessels	Normal

**Surgical importance:**

- More liable to trauma
- Pelvic → liable to injury at labor or cause dystocia
- More liable to stasis, stone formation and obstruction
- Different surgical approach



## 2-Horseshoe kidney:

-Due to fusion at on pole of the kidney (usually lower pole) → Failure of ascend & Rotation

-Pyelographic characteristics:

- Pelvis is anterior
- Lower calyces point medially
- Ureter & pelvis form “flower-vas appearance”
- The 2 axes are inverted and meet at the level of L4

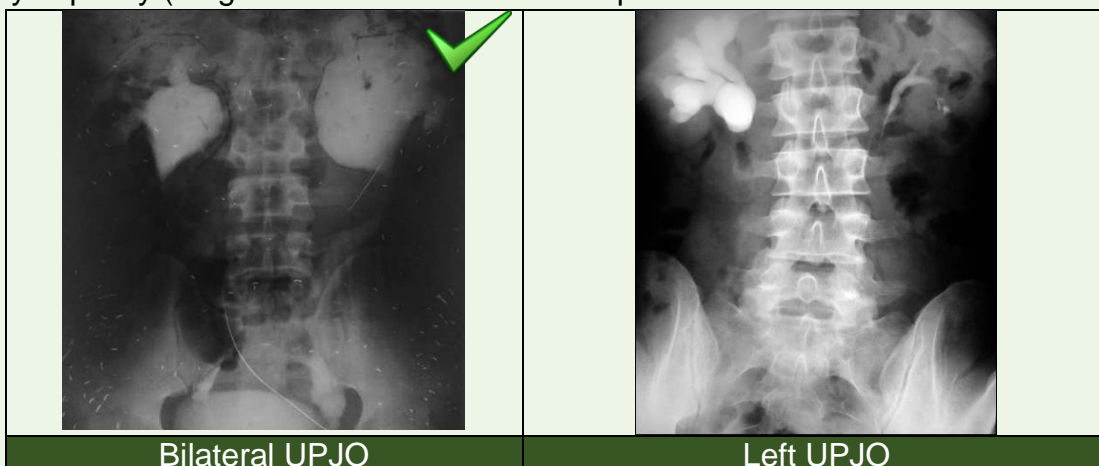
-C/P: Asymptomatic, liable for stasis, infection & stone formation

-Surgical importance: •Abnormal vasculature •Different approach (anterior trasperitoneal)



## 3-Uretero-pelvic junction obstruction (UPJO):

Treatment: Pyeloplasty (surgical reconstruction of renal pelvis)





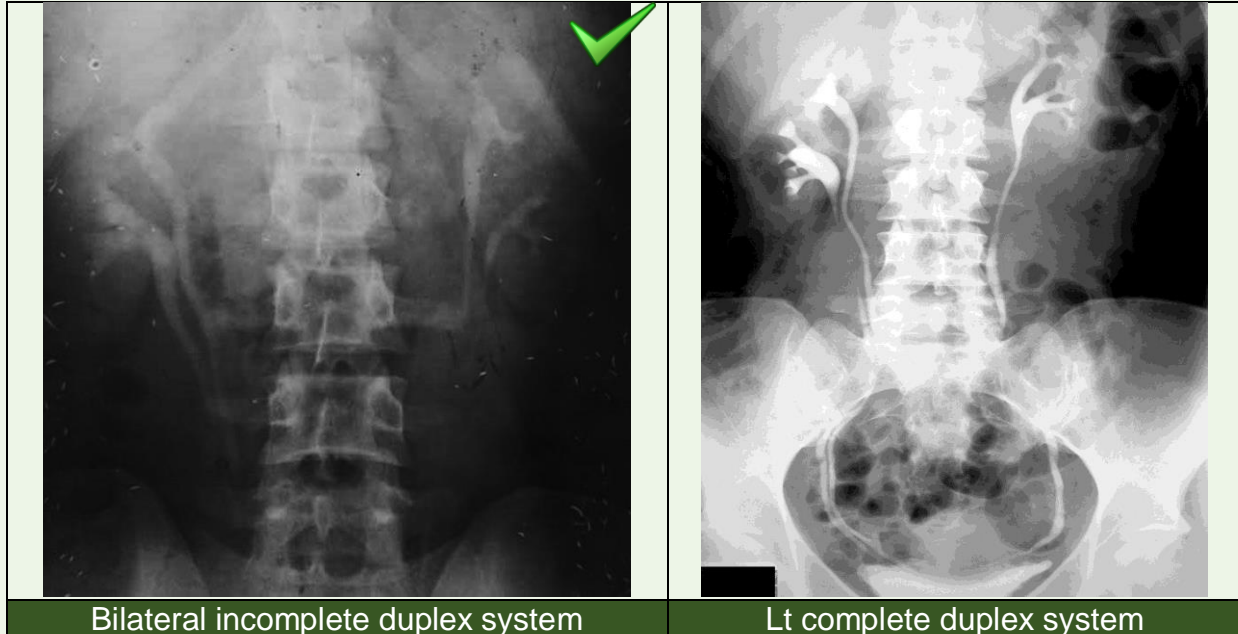
#### 4-Double ureter (Duplex system)

C/P: • Incomplete → usually asymptomatic

• Complete (each ureter opens separately at bladder):

1-In females: If 2<sup>nd</sup> ureter opens in distal urethra or at vagina → Incontinence

2-The upper ureter (that opens below in bladder) is more liable for obstruction while the lower ureter (that opens higher in bladder) is more liable for reflux



#### 5-Bladder Exstrophy (Ectopia vesicae):

Clinical features:

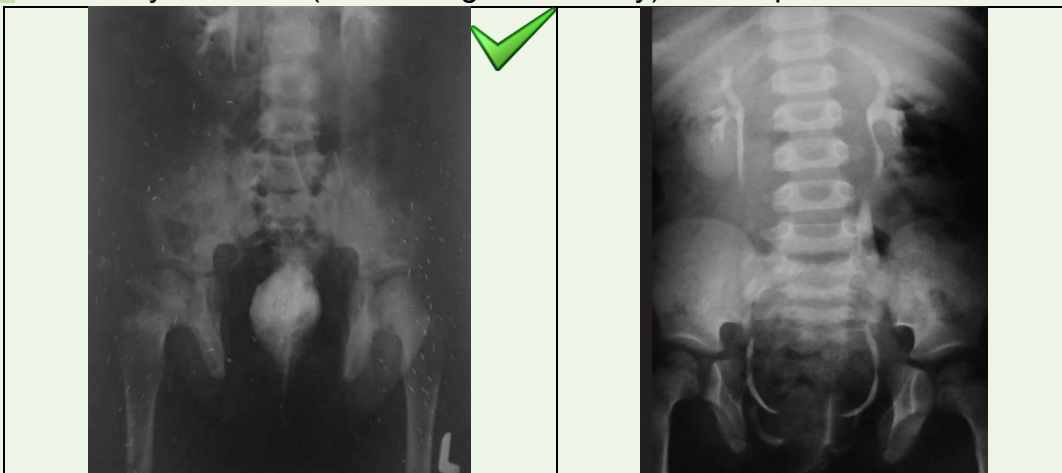
1-Deficient lower part of anterior abdominal wall & deficient anterior wall of bladder

2-Persistent irritation of bladder mucosa → Recurrent infections → metaplasia

3-Widening of symphysis pubis → Waddling gait

4-Umbilical hernia    5-Associated epispadias and undesc. testis in ♂ & vaginal anomalies in ♀

Treatment: • Urinary diversion (Uretero-sigmoidostomy)    • Complete reconstruction



\*Filling defect in the renal pelvis:

1-Radiolucent stones    2-Organized blood clot    3-Urothelial carcinoma

4-Sloughed renal papilla in DM    5-Pyelitis cystica in Bilharziasis

**Normal Cystogram:**

Shape	Bladder is oval (egg lying on its side)
Site	Lower border of bladder flushes with symphysis pubis
Extension	From upper border of SP to middle piece of sacrum when completely filled and extends laterally to the sidewall of the pelvis
Diameters	Vertical AP diameter is shorter than transverse diameter
Border	Smooth regular outlines along its circumference
Consistency	Homogenous white

**C) Benign prostatic hyperplasia / enlargement (BPH):****-Possible cystographic findings:**

- 1-Basal, central, regular & smooth filling defect → Infravesical BPH
- 2-Raised bladder base above symphysis pubis and pubic bones
- 3-Globular bladder: Detrusor hypertrophy → Thickened bladder wall
- 4-Serrated bladder outlines → Strained bladder
- 5-Diverticulum formation
- 6-Radiolucent stones
- 7-Ballooning of Foley's catheter in the midline → urine retention
- 8-Fish hook appearance of the intravesical ureter
- 9-Hydroureteronephrosis → Advanced cases of obstruction and chronic retention
- 10-Huge amount of residual urine in post-voiding film

**-C/P:****A) Obstructive symptoms:**

- 1-Hesitancy (difficulty to start)
- 2-Interrupted stream (difficulty to maintain)
- 3-Post-voiding dribbling (difficulty to end)
- 4-Acute urinary obstruction

**B) Irritative symptoms:**

- 1-Increased frequency
- 2-Dysuria & burning micturition
- 3-Urgency (sudden severe desire to void but patient can withhold till reaching bathroom)
- 4-Urge incontinence (escape of urine after sudden severe desire before reaching bathroom)

**C) Symptoms of complications****i) Urologic:**

- 1-Hematuria
- 2-Urinary tract infections
- 3-Bladder stones
- 4-Bladder diverticulum
- 5-Chronic urine retention with overflow incontinence
- 6-Chronic renal failure

**ii) Extra-urologic**

- 1-Hernia
- 2-Secondary piles
- 3-Rectal prolapse

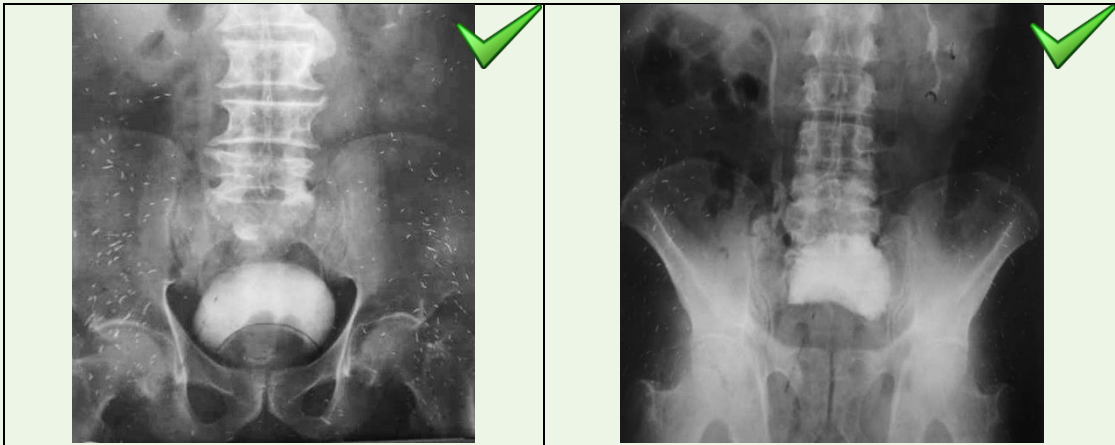
**-Investigations**

- 1-Ultrasound → Prostate size, associated pathology, residual urine
- 2-Cystoscopy → in frank hematuria to exclude malignancy
- 3-Lab → PSA (prostatic specific antigen) > 4 ng/mL

**-Treatment:****1) Medical**

- Avoid (5W): Wine, Winter, Withholding, Women, excessive Water
  - $\alpha$  adrenergic blockers: e.g. doxazosin
  - 5  $\alpha$  reductase inhibitors: e.g. finasteride
  - Phystotherapy
- 2) Transurethral resection of the prostate (TURP): with gland size of more than 60 gm
  - 3) Transurethral needle ablation (TUNA)
  - 4) Open prostatectomy: in very huge prostate





### -Causes of infra-vesical obstruction:

#### A) Bladder Neck:

- i- Congenital: e.g. congenital bladder neck obstruction
- ii- Acquired: -Intraluminal: e.g. Stones, blood clot, sloughed tumor, foreign body  
 -Wall: bladder neck contracture (d.t. Bilharziasis) -Outside wall: Prostatic (BPH, Cancer)

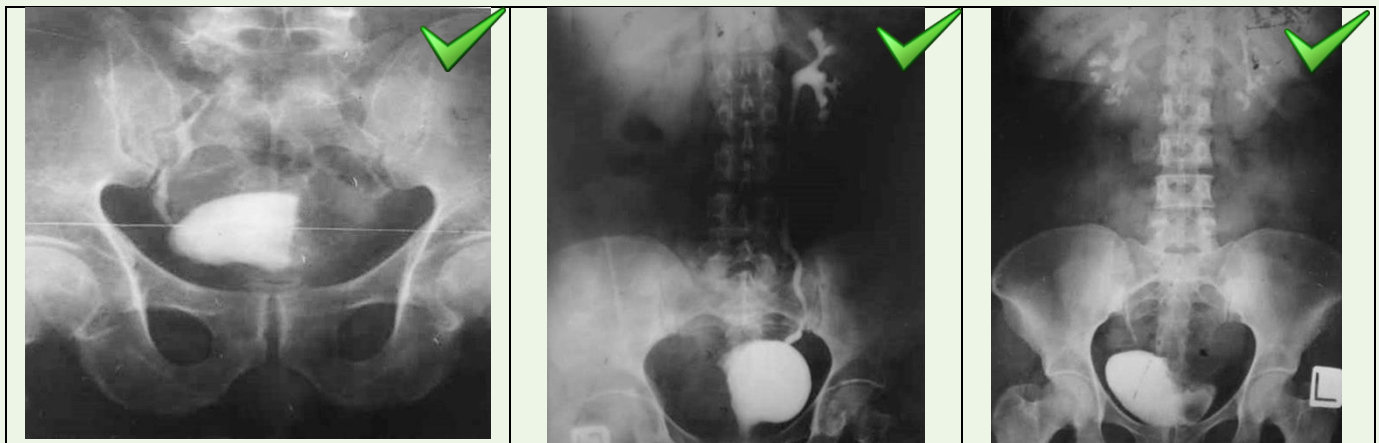
#### B) Urethra:

- i- Congenital: -Meatal stenosis -Posterior urethral valve  
 -Prepuce: Phimosis: prepuce cannot be fully retracted over the glans penis  
 Paraphimosis: prepuce becomes trapped behind the glans penis, and cannot be reduced
- ii- Acquired: -Inflammatory (e.g. Gonorrhea – Prolonged catheterization) -Traumatic -Neoplastic

### D) Bladder Mass:

#### -Causes of filling defect in the bladder

1-BPH	Basal central regular smooth
2-Bladder cancer	Irregular, anywhere
3-Radiolucent stone	Central, well defined & smooth
4-Balloon of Foley's catheter	Well defined & smooth
5-Organized blood clot	Central & irregular + history of hematuria
6-Ureterocele	Cobra-head appearance, basal & regular
7-Fungus ball	
8-Bilharzial polyp or granuloma	
9-Sloughed necrotic tissue	
10-Technical: incomplete filling	



**-Bladder cancer: Bilharzial or Not**

	Bilharzial	Non-Bilharzial
Site	Posterior & lateral walls except trigone	Trigone & lateral walls
Macroscopic	<ul style="list-style-type: none"> <li>•Cauliflower</li> <li>•Diffusely infiltrating</li> <li>•Malignant ulcer with everted edges</li> </ul>	Villous or papillary
Microscopic	Mainly squamous cell carcinoma	Mainly transitional cell carcinoma
C/P		
Age	Young adult	Older (>50 yrs)
Symptoms	1-Exaggerated cystitis syndrome with ↑frequency & burning micturition 2-Nectroturia	Only "Hematuria" which is : sudden, painless, total, profuse, intermittent
Signs	Suprapubic tenderness & mass	Nothing
Treatment	A) Operable: 1-Radical cystectomy 2-Supra-vesical shunts: e.g. Uretero-sigmoidostomy B) Inoperable: Symptomatic & Palliative TTT	A) Operable: (acc. to stage) 1-Transurethral resection then chemotherapy or radiotherapy 2-Partial cystectomy 3-Radical cystectomy

**Investigations:**

1-Abdominal U/S 2-KUB film: for calcification & other pathologies

3-IVU: Irregular lateral filling defect

"Any irregular filling in cystogram defect should be considered bladder cancer till proved otherwise"

4-CT: for degree of infiltration and staging

5-Cystoscopy + Biopsy + Bimanual examination under anesthesia:

- Cystoscopy: to confirm diagnosis of mass and show other pathology
- Biopsy: for histopathology
- Bimanual examination under anesthesia: to evaluate degree of mobility

**2-Other contrast studies****A) Ascending Cystogram:**

	Ascending (Retrograde)	Descending (Anterograde)
Concentration	More	Less
Dye in ureters	Absent except in vesico-ureteral reflux	Usually present
Catheter	Present	Usually absent

**Indications:**

1-Evaluation of bladder in lower abdominal trauma with inability to void

2-Evaluation of bladder diverticulum 3-Evaluation of any fistula 4-Suspected vesico-ureteral reflux

**Contraindications:** Urethral injury (blood at meatus)

**B) Descending Nephrostogram****Indications:**

1-Assessment of an obstructing lesion (e.g. calculus, tumor, stricture or UPJO) when other radiological has been insufficient

2-Assess residual stone fragments following PCNL

3-Detection of ureteric fistula





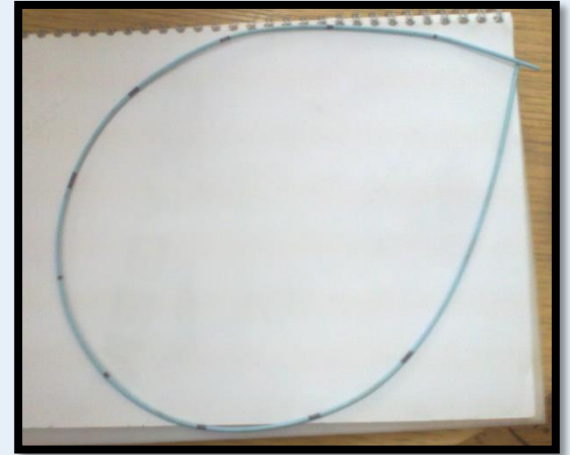
Ascending Cystogram



Descending Nephrostogram

**1) Ureteral:****a-Non self-retaining ureteric catheter:****Indications:**

- 1-Diagnostic:
  - Split kidney function
  - Ascending ureterogram, pyelogram
- 2-Therapeutic:
  - Treatment of acute obstruction (anuria)
  - Post operative (e.g. ureterolithotomy, pyeloplasty)

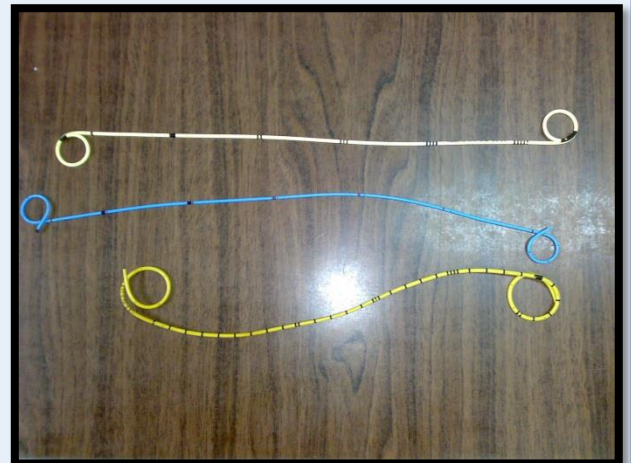
**Insertion:** by Cystoscope**Holding:** by Foley's catheter**Duration:** 48-72 hours**Complications (of neglected catheter):** Infections**b-Double J (Self-retaining) ureteric catheter:****Indications:**

Therapeutic (only):

- Post operative (e.g. ureterolithotomy, pyeloplasty)
- Pre-ESWL (in some cases like one kidney patients)

**Duration:** 2-4 weeks**Complications:**

- 1-Downward migration of upper coil → the catheter becomes an obstructing agent
- 2-Upward migration of lower coil → Irritation symptoms
- 3-Fibrosis → Calcification – stone formation

**2) Urethral:****a-Non self-retaining (Nelaton):****Indications:**

- 1-Diagnostic:
    - Urethrogram, cystogram
    - Detection of amount of residual urine
  - 2-Therapeutic:
    - Treatment of acute retention
- \*It's made of plastic



**b-Self-retaining (Foley):** (Double way)**Indications:**

- 1-Diagnostic:
  - Urethrogram, cystogram
- 2-Therapeutic:
  - Treatment of Chronic retention
  - To monitor urine outflow
  - Bladder wash in urinary tract injuries

**Complications:**

- Trauma
- False passage
- Prolonged use leads to urethritis

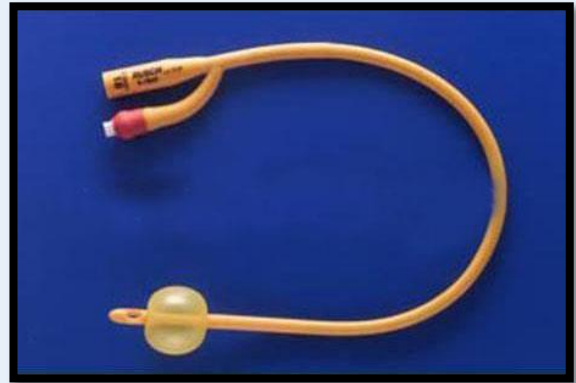
**Holding:** by injection of saline into the balloon

**Triple way:** (indications)

Irrigation of bladder in cases of severe hematuria

**Duration:** 10 days

**Types:** -Latex → Cheap    -Silicon → less irritant

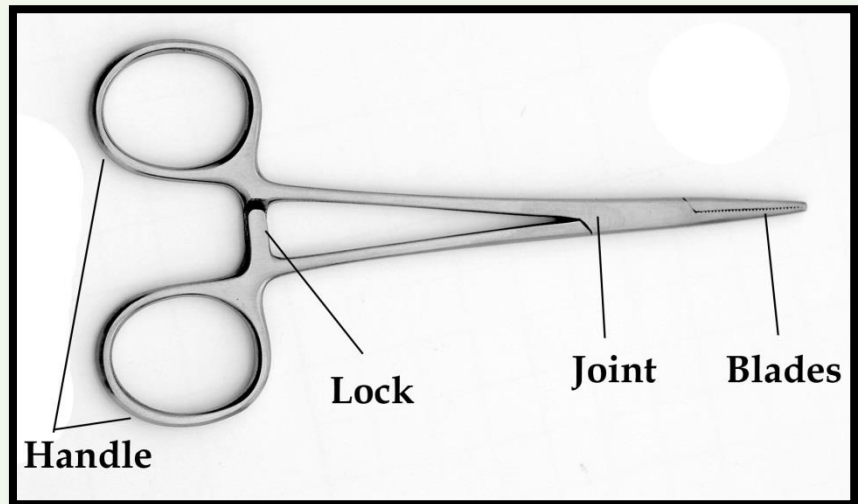
**3-Malecot & De pezzar:** (Self Retaining)**Indications:**

- 1-As a suprapubic tube: to drain bladder in cases of Urethral injury or obstruction of after prostatectomy
  - 2-As a nephrostomy tube: in PCN
- \*\*De pezzar has a mushroom like head



**Parts of the forceps:**

- 1-Handle
- 2-Joint
- 3-Blades
- 4-Lock (only in self-retaining)



**A) Non self-retaining:**

**Stone Forceps**



Forceps	Ureterolithotomy forceps	Nephrolithotomy forceps	Cystolithotomy forceps
Use	remove stones from the ureter	remove stones from calyces & renal pelvis	remove stones from the urinary bladder

**Toothed /Non -toothed forceps:**

**Toothed:**

holding tough structures e.g skin, muscles



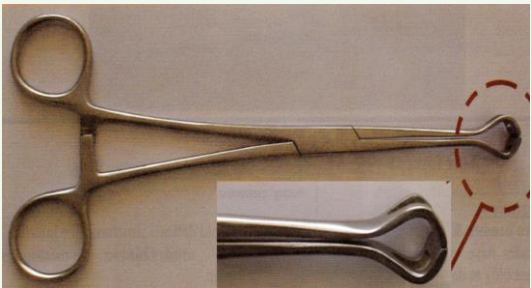
**Non-toothed:**

holding delicate structures e.g. vessels





B) Self-retaining:

		
Forceps	Renal Pedicle clamp	Right angle forceps
Use	Control of renal artery & vein during nephrectomy	Ligation of bleeding vessel
		
Forceps	Kocher's forceps	Ali Ibrahim (ring) forceps
Use	Holding of tough structures e.g. muscle	hold delicate structures
		
Forceps	Allis forceps	Babcock forceps
Use	hold delicate structures e.g. ureter, bladder	
		
Forceps	Artery forceps	Mosquito forceps
Use	Control of a bleeding vessel	

**1-Gil-Vernet (Renal sinus) retractor: (non self-retaining)****Use:**

Good exposure of internal collecting system during pyelolithotomy

**2-Abdominal wall retractor:**

Self retaining



Non self-retaining (Deavor)

**3-Self-retaining bladder retractor:**

**1-Metal urethral dilator:****Uses:**

- Dilatation of dilatable urethral strictures intermittently
- Dilatation of CBD stricture      -Dilatation of the ureter

**2-Periosteal elevator:****Uses:**

Elevate periosteum of last rib to avoid injury of Intercostal muscles & neuromuscular bundle

**3-Rib raspatory:****Uses:**

Remove of all periosteum after rib detachment

**4-Dormia basket:****Uses:**

Extraction of stones via endoscopy



5-Urine collecting bag



6-Guidewire



7-Scissors



8-Cystoscope



9-Lithotrite ( used in cystolitholapaxy)